

AI based E-ATM Security and Surveillance System using BLYNK -IoT Server

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Abstract— In recent years, ATM theft and robbery have become significant problems at ATM facilities. The primary objective of the proposed work is to prevent ATM theft and maintain security. Current security systems do not adequately protect alarm systems and surveillance cameras. The main aim of this project is to take advantage of the ESP32 platform and Blynk IoT to strengthen the security system. In this project, when the ATM vibrates, the door will instantly close, it will transmit the alert data through the BLYNK IoT app and the IoT device will send an audible signal to notify the surroundings and upload all the data. To activate the buzzer and chloroform frequently, a custom Android app using the BLYNK app decodes the command before sending it to the microcontroller. Esp32 has been used to establish the connection between the device and the IoT platform. As far as the above security elements are concerned, digital smart security systems are a special type of fusion that provides clear answers to security questions. When the system is applied successfully, goals are achieved without deviation. This project has a lot of potential because of its protective features. The proposed smart IoT security system has been used in different real time application.

Keywords— Smart ATM Security, esp32, Blynk IoT App, GPS and Surveillance system.

I. INTRODUCTION

ATMs have evolved into one essential device in modern society. Users can withdraw funds from their approved account at any time using this feature. Some ATMs are located outside the area. Theft and robbery are the most common problems in ATM centres. ATM applications have resulted in the development of numerous surveillance cameras and security alarm systems. As a result, computerized security systems are essential in deterring theft [1]. The rise in thefts, inversely proportional to the relationship between automation and physical proliferation, compensates for the reduction in banking personnel. Robbery accounts for a very high proportion (over 90%) of crimes in financial institutions, and ATM crime is increasing due to the expansion and continued exposure of external ATMs [2]. Therefore, this study proposes ways to act quickly and minimize losses, including using GSM technology to identify ATM identities in real time in the event of a theft. Therefore,

security and monitoring systems must be strengthened to protect ATM systems. It uses IoT technology to notify information to the nearest police station, and the banking industry. CCTV cameras have long been used to capture video. It is used to prevent theft and monitor ATM centers around the clock [3].

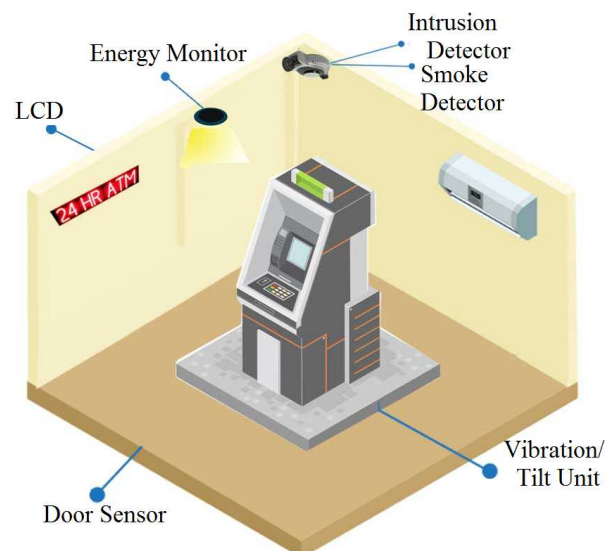


Fig. 1. ATM security system

A. ATM Monitoring System

ATMs are now critical to facilitating positive interactions between customers and the financial system. ATMs in rural areas and highways are vulnerable to theft, but banks do not report cybercrime losses. The rise in nighttime looting is a major social issue at ATM locations. Figure 1 depicts the surveillance and security systems implementation to improve security and track robberies at the relevant ATMs. Figure 2 depicts a proposed online ATM surveillance system. ATM centers are equipped with integrated sensor-based security systems. A security system consists of a sensing, computation, communication, and surveillance unit [4].

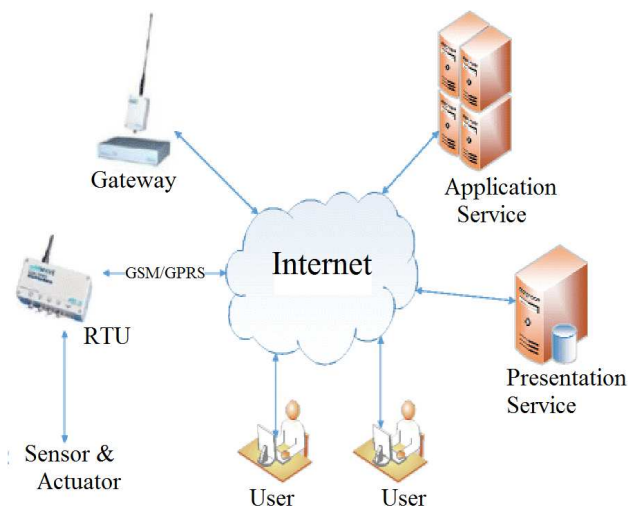


Fig. 2. IoT ATM security system

II. LITERATURE SURVEY

Humans have used locks and keys for over 2,000 years. For security reasons, we have updated our security system. Recently, IoT technology has evolved, and wireless communication has replaced the locking system. His Number Lock mechanism on the keyboard is very important. Lock the system using a password and PIN instead of the system key. However, there are many problems, such as the possibility of the password being stolen or forgotten, or the inability to unlock the door during a power outage. Security systems that use information about a person to identify an individual are called biometric systems. For security reasons, biometric authentication systems such as facial recognition, fingerprint authentication, and iris/retina authentication are employed [5].

Nowadays, security and authentication are improved by using electronic locking mechanisms. GSM and Bluetooth communication are supported by an encrypted secure smart lock system. In addition to making and receiving calls and text messages, smartphones are now great for many uses. Mobile operating systems and internal applications can be used to remotely check voice-off structures in real time for banking and many other purposes [6]. Our proposed system has been developed to the point where it can be operated remotely by voice commands. Integrating this feature makes our machines very convenient and efficient on a limited budget. This is probably the most efficient energy saving technique. Many strategies have been developed to achieve the above goals [7].

Design an ATM. Customer satisfaction with bank-provided ATMs is the main theme of "Customer Satisfaction ATM", and it also proposes ways to improve services. The authors recommend, among other things, increasing the visibility of numerous buildings and tightening the daily cash withdrawal limit. Second place was the quality of receipts, first place he had 24 hour access [8]. S. Sifat et al (2014) Card and foreign currency fraud, logical attacks, and physical attacks are classified into three categories: ATM machines (ATM) and "Secure Automated Teller Machines and Cash Deposit Machines

(CDM)". is the classification of Due to exchange rate regulation, banknote security must be considered when developing ATMs. This report is not backed up by large amounts of data and is more theoretical [9].

S. Fleck and W. Straber and their mostly smart camera-based surveillance systems at home. Western society is aging rapidly. It would be difficult to provide 24/7 automatic monitoring for privacy-conscious seniors. In addition to traditional surveillance applications in airports, government agencies, and commercial buildings, this is a typical application for newly reported video surveillance applications. Analysis shows he has three flaws in the current surveillance system. A GSM-based ATM surveillance and security system is described in records [10-13]. In this study, we used PIC and GSM microcontrollers to create a secure system. Alert security personnel and the banking industry in the event of a theft. Video is continuously tracked and recorded by a digital camera throughout the day. CCTV control rooms store a large amount of video. But watching videos at night is very difficult.

For various applications, Ramalingam et al. proposed the Blynk IoT server-based efficient data transmission method [14-17]. A wireless sensor network and Blynk were used to create an intelligent Internet of Things (IoT) device by Venkatramanan and Ramalingam. This intelligent Internet of Things device has been used to gather and send data into the cloud [18]. Using this IoT hardware design as a foundation, we create a low-cost smart device for missing person detectors. A smart wireless communication method has been developed using LDPC decoder [19, 20].

III. PROPOSED METHOD

The concept aims to deter ATM theft by addressing the shortcomings of technology already in use in society. The proposed security system was created using ESP32, vibration sensors and Blynk IoT platform. Vibration sensors are used to measure vibration levels inside ATMs during robberies and thefts. This sensor transmits vibration data in real-time to the ESP32 for detection. The microcontroller communicates with the Blynk server. BLYNK IoT Android app designed specifically for ATM security applications. A vibration sensor detects the strength of the vibration and sends it to the microcontroller as the thief attempts to break into the ATM. When vibration levels reach extreme levels, the device instantly shuts down ATMs and alerts nearby locations. Door driven by stepper motor.

A relay loop sprinkler sprays the thief with chloroform gas, rendering him unconscious. Notifications are sent from the Control Unit to interested parties via the Internet. Only bank employees can enter the code to open the door. This detectors theft and makes it easier to catch the perpetrators. ATM applications are secure thanks to an IoT-driven security monitoring system. Use software and hardware components to build intelligent systems. Hardware includes a GPS, PIR, ADXL337, power supply circuit, and ESP32. Vibration sensors transmit an analog output if the ATM system is attempted to be forced open or damaged. When the analog value of the vibration sensor is more than the standard limit, the ATM door

closes instantly and an emergency alert is sent to the closest police department and security staff. ATM doors are locked to prevent theft. The BLYNK Android App is built with security.

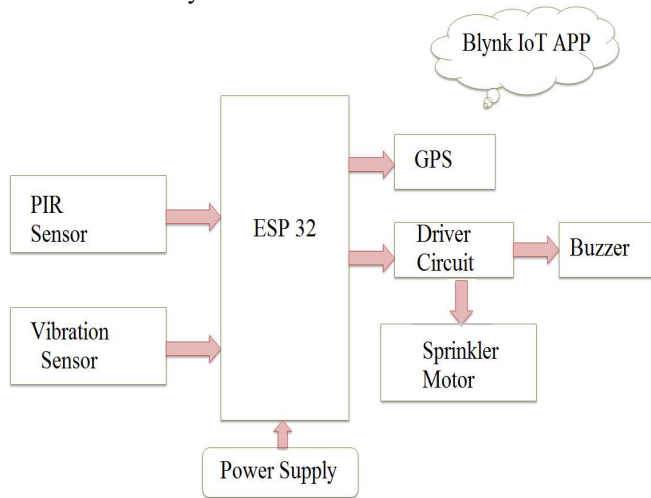


Fig. 3. Proposed block diagram

When the microcontroller recognizes that someone is moving within 10-12 meters of the sensor webcam, it activates the esp32 camera to take continuous pictures. A unique feature currently in development is his IoT-based alert notification using a serial protocol. A proposed online-based security system includes vibration sensors that alert authorized security personnel and bank security departments when suspicious activity is detected, allowing victims to be quickly defended. This IoT gadget is an independent continuous and secure monitoring system

A. System Architecture

A protection system requires automation as a key component. The design and implementation of safety systems is the goal of this project. The system allows remote control via IoT-enabled mobile smart phones. As you know, over the past three years, consumers have relied on ATM machines, also known as ATMs, to efficiently meet their banking needs. The design and implementation of ATM-based security alert programs are largely based on observations of real-world events occurring in the surrounding environment. The suggested high-tech security system will aid in catching thieves who attempt to steal ATMs. The Internet of Things-based architecture of an ATM security system is depicted in Fig.4.

The Blynk app can display ATM locations transmitted by GPS. Using the BLYNK app, the esp32 security camera transmits video in real time to authorized recipients. Your phone is loaded with a monitored security application. You can also turn on or off certain devices, such as warning systems or chloroform gas. Its name is "control unit". A design program called Blynk comes pre-installed on Android devices. The Blynk app communicates with the esp32 and sends the alert messages through the internet. The authorized person

unlocked or opened the ATM door once more after confirming the password using the blynk application.

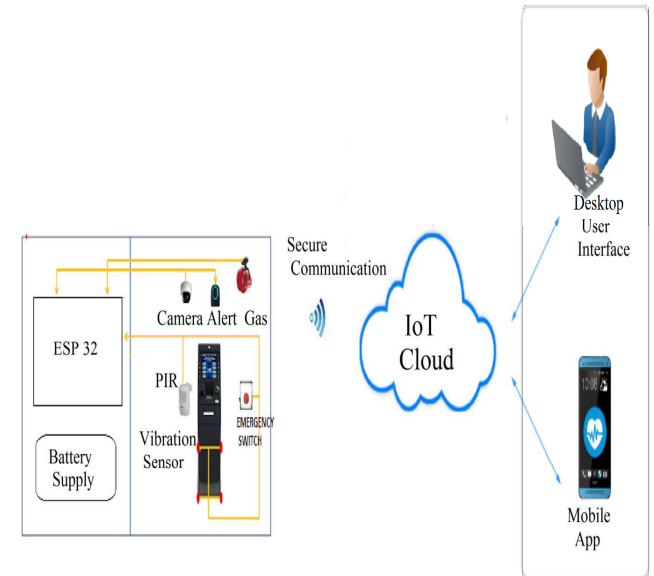


Fig. 4. Architecture of proposed system

B. PIR Sensor

Passive infrared sensors are PIR. ATM centers can recognize human movements. His 3.3V operating voltage on the sensor sends a digital signal to the ESP32. Pin D1 is where this sensor is connected. Notify the appropriate parties of any movement. This sensor is placed on the back of the ATM. Fig.5 shows the PIR sensor.



Fig. 5. PIR sensor

C. Vibration Sensor

Vibration levels in the ATM are monitored using vibration sensors. To determine if there is vibration above a threshold, the vibration module employs a comparator LM393 and an SW-420. The threshold can be adjusted using the onboard potentiometers. The output logic of this module outputs a low level signal when there is no action, indicating that the LED is on, and vice versa. When a robbery occurs, the system uses vibration sensors (piezoelectric sensors) to detect vibrations from the ATM. Fig.6 shows the Vibration Sensor.

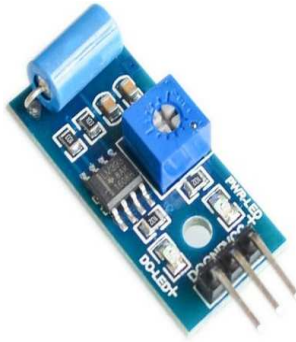


Fig. 6. Vibration Sensor

D. Relay circuit

Relay circuits operate ATM sprinkler and warning systems. ESP32 D5 and D6 link the two relay circuits together. The microcontroller automatically turns on the sprinkler motor and buzzer whenever an event or vibration takes place. Sprinklers, relays, and buzzers all run on 12 volts. Fig.7 shows the relay circuit.

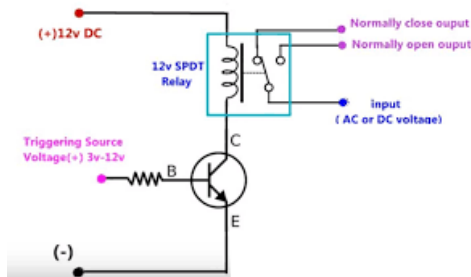


Fig. 7. Driver circuit for Alert system

E. ESP32 AI camera

A web server continuously monitors images and video and transmits such data to authorized personnel using esp32 camera is shown in Fig.8. The embedded C language is used to program the identified IP address. To view pictures and videos of the ATM system, enter the IP address and URL.



Fig. 8. ESP32 camera

F. Blynk IoT

A new IoT-based App has been designed for ATM security. The proposed hardware components connect to the IoT via Wi-Fi gadgets. The Blynk IoT server monitors hardware output behavior and events in real-time. IoT is used to operate door locks. The Blynk IoT platform is shown in Figure 8.

IV. RESULT ANALYSIS

In this project new intelligent security system has been developed using IoT. The sensor is interfaced with esp32 and sends real-time data to Cloud. If any event or theft occurs, it automatically sends the alert system to the authorized person via the IoT app. GPS has been used to find the ATM centre location. The esp32 camera transmits the image or video to an authorized person. It's important to understand the application and problem definition before selecting the ideal sensors and rails for Wi-Fi connection. The outcome of the implementation of the hardware unit is shown in Figure 9.

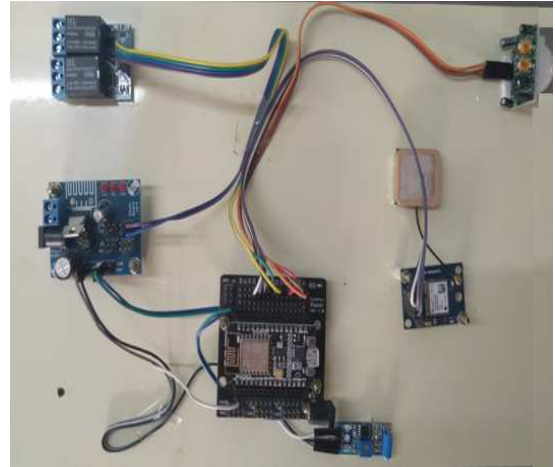


Fig. 9. Implemented Hardware Module

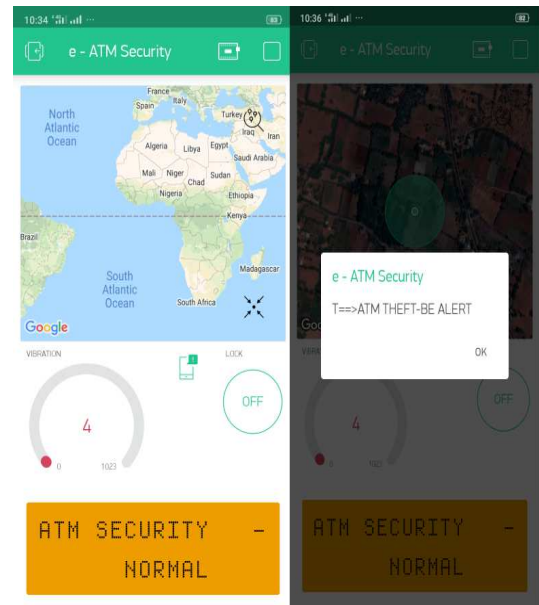


Fig. 10. ATM theft Alert using IoT App

Figures 10 and 11 show the results of the IoT-based online security and surveillance for ATM system. Created a custom Blynk Android app for the ATM security app. This program is used to monitor ATM centers around the clock.

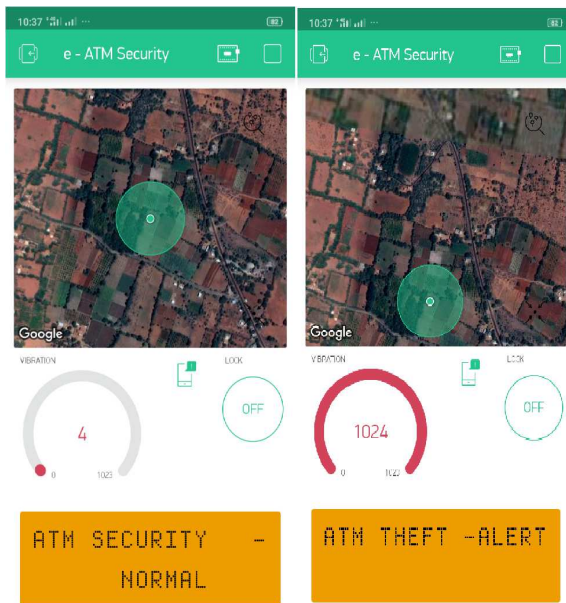


Fig. 11. IoT Mobile App result for e-ATM.

V. CONCLUSION

The presented e-ATM security system will serve ATM security applications. This project is capable of monitoring and detecting ATM theft. GPS, vibration sensors, and esp32 development hardware are all recommended. A modern intelligent security device has been introduced for ATM security systems. In this device, sensing elements are interfaced with the ATM unit. If any event occurs, it automatically sends the alert message to the nearest police station, bank sector and security staff using IoT Blynk Server. The GPS tracking device continuously shares the location of the ATM with the authorized person. The esp2 AI camera continuously sends the image and video to the cloud server. Our recommended hardware is both dependable and cost-effective for real-time security applications. In future work, artificial intelligence-based algorithms and novel IoT protocols will be proposed to enhance ATM security.

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